

CLAIMS

What is claimed is:

1. A composition of matter, comprising:
 - (i) a solid material having pores; and
 - 5 (ii) a gel, said gel being substantially contained within the pores of said solid material and comprising at least one catalytically active element, and optionally when said catalytically active element is other than chromium, comprising chromium in addition to said element.
- 10 2. The composition of Claim 1 wherein the solid material having pores is selected from the group consisting of alumina, silica, titania, zirconia, carbon, molecular sieves, porous minerals, microporous, mesoporous and macroporous materials, montmorillonites, aluminosilicate clays, and binary, ternary, quaternary and higher order oxides, carbides, nitrides, phosphates, and sulfides.
- 15 3. The composition of Claim 1 wherein said catalytically active element is chromium and said solid material having pores is alumina.
4. The composition of Claim 2 wherein said catalytically active metal is selected from the group consisting of platinum and gold.
- 20 5. A process for preparing a composition of matter comprising a solid material having pores; a gel, said gel substantially contained within the pores of said solid material and comprising at least one catalytically active element, and optionally when said catalytically active element is other than chromium, comprising chromium in addition to said element, said process comprising:

contacting in the presence of a solid material having pores, in any order a protic solution with a non-aqueous solution wherein said non-aqueous

25 solution comprises a gel-forming precursor and wherein one of either the protic solution or the non-aqueous solution comprises at least one soluble compound comprising an inorganic element selected from the group consisting of Li, Na, K, Rb, Cs, Be, Mg, Ca, Sr, Ba, Y, La, Ti, Zr Hf, V, Nb, Ta, Cr, Mo, W, Mn, Re, Fe, Ru, Os, Co, Rh Ir, Ni, Pd Pt, Cu, Ag, Au, Zn, Cd, B, Al, In, Si, Ge, Sn, Pb, P, As,

30 Sb, Bi, S, Se Te, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu and lanthanides of the Periodic Table, under such conditions such that the solution added first is at incipient wetness, whereby gel formation occurs substantially within the pores of said solid material.
- 35 6. The process of Claim 5 wherein the solid material having pores is a catalyst support selected from the group consisting of alumina, silica, titania, zirconia, carbon, molecular sieve, porous mineral, montmorillonite clay, aluminosilicate clay, carbide, nitride, phosphate, and sulfide and said gel-forming precursor comprises at least one soluble compound comprising an inorganic

element selected from the group consisting of aluminum, silicon, titanium, zirconium, niobium, tantalum, vanadium, molybdenum and chromium.

7. The process of Claim 6 wherein the catalyst support is alumina and the gel-forming precursor is a chromium salt.

5 8. The composition of matter prepared by the process of any one of Claims 5, 6 or 7.

10 9. An improved gel composition, wherein said improvement comprises: said gel is substantially contained within pores of a solid material selected from the group consisting of alumina, silica, titania, zirconia, carbon, molecular sieves, porous minerals, montmorillonite clay, aluminosilicate clays, carbides, nitrides, phosphates, and sulfides.

15 10. A method of using the composition of Claim 1 or the improved gel composition of Claim 9 wherein said method comprises contacting in a dehydrogenation process reactor said composition with a hydrocarbon feed, said hydrocarbon being from C₂ to C₁₀.

11. The method of Claim 10 wherein said hydrocarbon is selected from the group consisting of ethane, propane, and isobutane.

20 12. The method of Claim 11 wherein the gas hourly space velocity of the feed gas is from about 100 cc hydrocarbon feed per cc gel composition per hour to about 3000 cc hydrocarbon feed per cc gel composition per hour.

13. The method of Claim 12 wherein the gas hourly space velocity of the gas feed is from about 500 cc hydrocarbon feed per cc gel composition per hour to about 1000 cc hydrocarbon feed per cc gel composition per hour.

25 14. The method of Claim 11 wherein said composition is regenerated periodically to remove coke, said regeneration comprising heating said composition with an oxygen-containing gas.